



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁵ : B63B 35/32, E02B 15/10</p>	<p>A1</p>	<p>(11) International Publication Number: WO 92/20572 (43) International Publication Date: 26 November 1992 (26.11.92)</p>
<p>(21) International Application Number: PCT/SE92/00303 (22) International Filing Date: 11 May 1992 (11.05.92) (30) Priority data: 9101442-3 11 May 1991 (11.05.91) SE (71)(72) Applicant and Inventor: STADELL, Anders (SE/SE); P A Perssons gata 7, S-282 00 Tyngede (SE). (74) Agent: AWAPATENT AB; Box 5117, S-200 71 Malmö (SE). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (Euro- pean patent), GB (European patent), GR (European pa- tent), IT (European patent), LU (European patent), MC (European patent), NL (European patent), NO, SE (Eu- ropean patent), US.</p>		<p>Published <i>With international search report. In English translation (filed in Swedish).</i></p> <p style="text-align: center; font-size: 2em;">AB</p>
<p>(54) Title: DEVICE FOR REMOVING IMPURITIES FROM WATER</p> <div style="text-align: center; margin: 20px 0;"> </div> <p>(57) Abstract</p> <p>A device for removing impurities from water comprises a V-shaped floating cassette (1) having a rear portion (2) with projecting legs (3). The device further includes a tube (4) which is connected to the rear portion (2) and opens at a hole (5) therein and which is enclosed by a collecting means (8), and a vertically adjustable plate (6) which is rotatably connected to the cassette (1) for collecting the impurities at an optional depth of water.</p>		

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DEVICE FOR REMOVING IMPURITIES FROM WATER

The present invention relates to a device for removing impurities from water, more precisely a device which
5 comprises a substantially V-shaped floating cassette having a rear portion with projecting legs, and a collecting means.

SE 416,659, for instance, discloses techniques for removing and collecting impurities, such as oil, oil
10 products, dead animals, undesirable surface vegetation, and all sorts of rubbish, from the sea, lakes, rivers, streams, swimming pools, and other bodies of water. However, the device described in the SE patent has several drawbacks. Thus, its rear portion is made up of a number
15 of interconnected, tubular netting elements. However, since the number of these elements is fairly restricted, only a minor amount of impurities can be collected. Further, this device is only able to operate at a fixed depth of water, which is most unsatisfactory, since the
20 impurities are, of course, to be found at all levels. In addition, this prior-art device can only be used with a rather wide-meshed net, or the flow through the netting elements, as well as the compacting of the impurities therein, will become poor. If so, only lumps of oil and
25 other such fairly solid impurities can be collected.

The object of the present invention is to completely eliminate, or considerably reduce, the drawbacks of prior-art techniques.

According to the invention, this object is achieved
30 by a device exhibiting the distinctive features recited in the characterising clause of appended claim 1.

Thus, the device according to the invention is essentially characterised by a tube which is connected to said rear portion and opens at a hole therein and which is
35 enclosed by the collecting means, and a vertically adjustable plate which is pivotably connected to the cassette for collecting the impurities at an optional depth of water.

A preferred embodiment of the invention will be described in more detail below with reference to the accompanying drawing, in which

Fig. 1 is a schematic side view showing a device
5 according to the invention,

Fig. 2 is a top view showing the device of Fig. 1,

Fig. 3 is a view showing a vertically adjustable bottom plate according to the invention, and

Fig. 4 is a broken-away side view showing a rear portion of the device.
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Figs 1 and 2 illustrate a preferred embodiment of the invention, which comprises an adjustable, floating cassette 1 having a rear portion 2 tapering conically into a tube 4. Front legs or pontoons 3a, 3b and rear legs or pontoons 13a, 13b are connected to the rear portion 2. Advantageously, the pontoons 3a, 3b, 13a, 13b are articulated to the rear portion 2 to make the device flexible when there is a wave motion. A vertically adjustable bottom plate or 'ski board' 6, which is pivotably connected to the rear portion 2 by a shaft 7, is provided between the front pontoons 3a, 3b. Preferably, the bottom plate 6 is perforated to a certain extent in order to reduce the water resistance. A collecting means 8, e.g. a fibre cloth or a fine-meshed net, is connected to the tube 4 which it encloses along part of its length. The fibre cloth 8 is maintained on the tube 4 by a clamp or brake means 14, e.g. a tightening strap permitting the fibre cloth 8 to be fed out at an optional rate. A valve 9 is provided in the tube 4. In the rear portion 2 in front of the opening of the tube 4 or in this tube, there is provided a feeder means 15, such as a propeller, flushing nozzles and a mechanical screw for pushing the impurity towards and into the fibre cloth 8 and compacting it. Also the front pontoons 3a, 3b may be equipped with feeder means, e.g. flushing nozzles 16.
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The cassettes 1 mounted on pontoons can be adjusted to different depths of water by means of the vertically adjustable bottom plate 6, as shown in more detail in Fig.

3. A front portion of the bottom plate 6 is perforated. Further, the bottom plate 6 is equipped with side walls 10 having lifting eyes 11 connected to the front pontoons 3a, 3b by wires, ropes, chains or the like, for adjusting the draught.

As shown in Fig. 4, the feeder means 15 is arranged in the rear portion 2 and is, in this embodiment, a propeller 15. This propeller is disposed just in front of the opening of the tube 4, and its driving device 17 is attached to an upper plate 18 of the rear portion 2.

The device 1 according to the preferred embodiment operates as follows. A device 1 (or several such juxtaposed devices) is winched or towed across the area of water from which an impurity is to be removed. The bottom plate 6 is set at a suitable depth, depending on the vertical spreading of the impurity. Thus, the impurity is transported by the movement of the device 1, optionally with the aid of water (jets) or compressed air supplied to the cassette 1 through the flushing nozzles 16. Then, the impurity is conducted into the tube 4 and the fibre cloth 8 by the propeller 15. If no propeller were provided, only a minor amount of water and impurity would be forwarded, and the main part would be forced out of the device by the considerable flow resistance offered by the fine-meshed fibre cloth and the turbulence which thus arises in front of the opening of the rear portion 2 (at 5 in Fig. 2). Thus, the mixture of water and impurity has to be driven into the tube and the fibre cloth by a rather strong force achieved by the propeller 15. The mixture is thus forced into the fibre cloth 8 which lets through the water but retains the impurity, which is compacted by the propeller 15. Also for collecting means with wider meshes, used e.g. when the impurity is made up of solid and largish elements, the propeller 15 serves to compact the impurity. By operation of the strap 14, the fibre cloth 8 is fed out as it is being filled with the impurity. When a suitable length of the fibre cloth 8 has been filled, the valve 9 is

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temporarily closed, whereupon the fibre cloth is drawn together or tied up, or riveted or the like, just behind the tube 4, and is cut off by a suitable device (not shown). This results in suitable, sausage-shaped elements
5 having a weight of about one to a few dozen tons, which are taken on board a boat, a barge or the like.

It goes without saying that the preferred embodiment described above and shown in the drawing is but one of many embodiments of the invention, and several modifica-
10 tions are thus conceivable within the scope of the invention as defined in the appended claims. For instance, the rear pontoons 13a, 13b may be dispensed with, the front pontoons 3a, 3b may at least partly consist of booms that can be extended to an optional length, and the feeder
15 means 15 may be a screw without a shaft portion provided in the tube 4.

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CLAIMS

1. A device for removing impurities from water,
5 comprising a substantially V-shaped floating cassette (1) having a rear portion (2) with projecting legs (3a, 3b, 13a, 13b), and a collecting means (8), c h a r a c -
t e r i s e d by a tube (4) which is connected to said rear portion (2) and opens at a hole therein and which is
10 enclosed by the collecting means (8), and a vertically adjustable plate (6) which is rotatably connected to the cassette (1) for collecting the impurities at an optional depth of water.
2. A device as claimed in claim 1, c h a r a c -
15 t e r i s e d in that a feeder means (15) for conveying the impurities through the tube (4) is provided in said rear portion (2) at the opening of the tube (4).
3. A device as claimed in claim 2, c h a r a c -
t e r i s e d in that the feeder means (15) is a
20 propeller, a mechanical screw, or a flushing pipe for water or compressed air.
4. A device as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the tube (4) is provided with a valve (9).
- 25 5. A device as claimed in any one of preceding claims, c h a r a c t e r i s e d in that at least part of the plate (6) is perforated.
6. A device as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the plate (6)
30 has side walls (10) extending upwardly therefrom.
7. A device as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the legs (3a, 3b) are provided with means for feeding the impurities towards said rear portion.
- 35 8. A device as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the collecting means (8) is a fibre cloth (8) which is impermeable to the

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impurities but permeable to water and which, as it is being filled, is fed out and divided into sausage-shaped elements.

9. A device as claimed in any one of the preceding
5 claims, characterised in that the legs (3a, 3b) are articulated to said rear portion (2).

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FIG.1

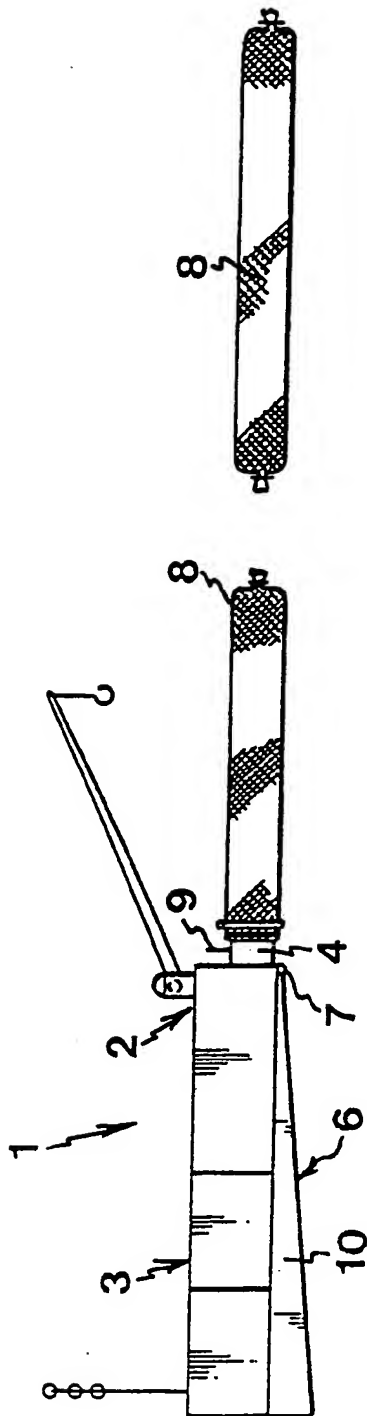


FIG.3

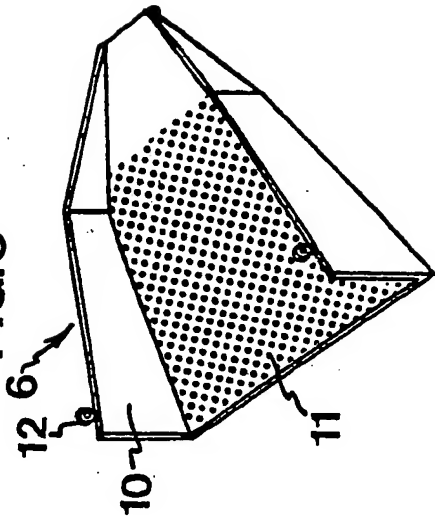


FIG.2

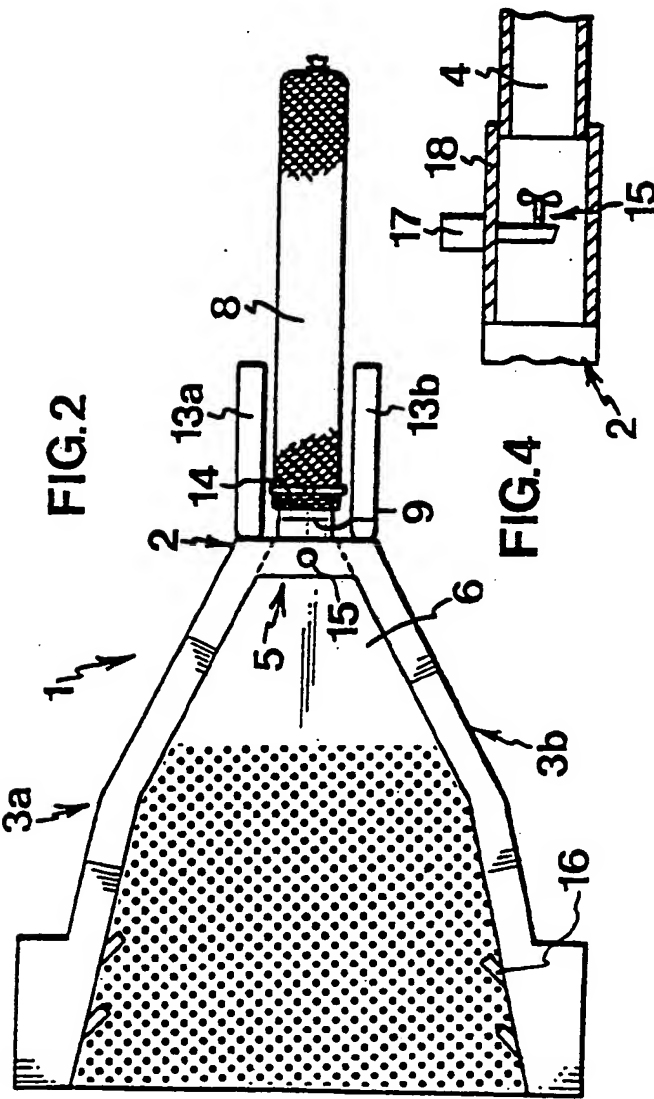
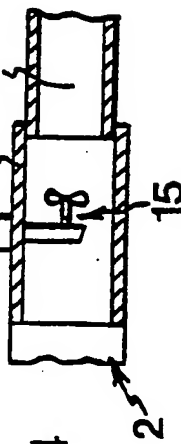


FIG.4



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00303

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 63 B 35/32, E 02 B 15/10														
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC5</td> <td style="padding: 5px;">B 63 B; E 02 B</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸</div> <p style="padding: 5px;">SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	B 63 B; E 02 B								
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category¹⁰</th> <th style="width: 60%; padding: 5px;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 30%; padding: 5px;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">SE, B, 416568 (H. NYFELDT ET AL) 19 January 1981, see the whole document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-19</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">SE, B, 428137 (NORDCON AB) 6 June 1983, see the whole document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3700108 (FRANK A. RICHARDS) 24 October 1972, see the whole document -- -----</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-9</td> </tr> </tbody> </table>			Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	SE, B, 416568 (H. NYFELDT ET AL) 19 January 1981, see the whole document --	1-19	A	SE, B, 428137 (NORDCON AB) 6 June 1983, see the whole document --	1-9	A	US, A, 3700108 (FRANK A. RICHARDS) 24 October 1972, see the whole document -- -----	1-9
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<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>														
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of the Actual Completion of the International Search 27th July 1992 </td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of Mailing of this International Search Report 1992 -07- 3 0 </td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;"> International Searching Authority <div style="text-align: center; padding-top: 10px;">SWEDISH PATENT OFFICE</div> </td> <td style="border-bottom: 1px solid black; padding: 5px;"> Signature of Authorized Officer <div style="text-align: center; padding-top: 10px;">Ake Olofsson <i>Ake Olofsson</i></div> </td> </tr> </table>			Date of the Actual Completion of the International Search 27th July 1992	Date of Mailing of this International Search Report 1992 -07- 3 0	International Searching Authority <div style="text-align: center; padding-top: 10px;">SWEDISH PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center; padding-top: 10px;">Ake Olofsson <i>Ake Olofsson</i></div>								
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 92/00303**

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE-B- 416568	81-01-19	CA-A- 1113022	81-11-24
		FR-A-B- 2416305	79-08-31
		JP-A- 54120926	79-09-19
		SE-A- 7801236	79-08-03
		US-A- 4211659	80-07-08
SE-B- 428137	83-06-06	SE-A- 7907887	81-03-25
US-A- 3700108	72-10-24	NONE	